Rice University
Department of Psychology

PSYC 370: Human Factors and Ergonomics Fall 2016

MWF 10-10:50, SH303

Instructor

Dr. Philip Kortum
488 Sewall Hall
Email: pkortum@rice.edu
713-348-4813
Office Hours Monday and Wednesday 2:00-3:00, or by appointment

Required Texts:

M. S. Sanders & E. J. McCormick (1993). *Human Factors in Engineering and Design*, 7th Ed. NY: McGraw-Hill

Casey, S. (1998). Set *Phasers on Stun and other true tales of design, technology and human error.*, 2nd Ed., Santa Barbara, Aegean

Other assigned readings will be posted on Owlspace.

Learning Outcomes: At the end of this course, students will:
1) Have a clear understanding of the fundamental concepts in human factors and ergonomics
2) Understand how limits of human cognition and perception impact engineering design
3) Be able to identify major human factors weaknesses in engineered systems
4) Be able to specify the design of an engineered system so that it supports limitations imposed by human cognition, perception, and physical factors

Date	Lecture	Topic	Readings
8/22	1	Introductions, Class logistics and the 8 Basic Principles of Design	Notes
8/24	2	History of Human Factors Deficiency Examples 1	Chapter 1
8/26	3	Research and evaluation methods Deficiency Examples 2	Chapter 2 Handout: TAC: Death on Call
8/29		Heuristic exercise Deficiency Examples 3	Notes
8/31	4	Information Processing 1 Deficiency Examples 4	Chapter 3 Stun: Double Vision
9/2	5	Information Processing 2	Chapter 3 Stun: That newfangled technology
9/5		***Labor Day – No class***	
9/7	6	Decision Making *Engineering deficiency presentations start*	TAC: Signal Detection Handout from Wickens et al
9/9	7	Static Visual displays 1	Chapter 4 Stun: Silent Warning
9/12	8	Static Visual displays 2 Sign exercise	Chapter 4 Stun:Set Phasers on stun

9/14	9	Dynamic Visual displays 1	Chapter 5 Stun: The peppermint twist
9/16	10	Dynamic visual displays 2	Chapter 5 Stun: Zzzs in Zeebrugge
9/19		**Exam 1** (Lectures 1-10)	
9/21		***No class – Instructor at HFES*** Work in your teams on your projects	
9/23		***No class – Instructor at HFES*** Work in your teams on your projects	
9/26	11	Auditory displays	Chapter 6 Stun: Never cry wolf
9/28	12	Tactile and olfactory displays	Chapter 6: Stun: In search of the lost cord
9/30	13	Speech communications	Chapter 7 Handout: TAC: 911 more or less
10/3	14	Physical work	Chapter 8 Stun: Tigershark!
10/5	15	Motor skills	Chapter 9
10/7	16	Control of systems	Chapter 10 Stun: Leap of Faith
10/10		***No class – Mid Term Recess***	
10/12	16b	Control of systems	Chapter 10
10/14	17	Physical controls	Chapter 11 Stun: Return from Salyut
10/17	17b	Physical controls	Chapter 11 Stun: A memento of your service
10/19	18	Data entry Keyboard designs	Chapter 11
10/21	18b	Data entry	Chapter 11 Stun: The wizards of wall street
10/24	19	Tools	Chapter 12
10/26	20	Physical space design	Chapter 14 Stun: Rental Car
10/28		**Exam 2** (Lectures 11-19)	
10/31	20b	Workplace design 2/ Anthropometry	Chapters 13 & 15 Stun: Business in Bhopal

11/2	20C	Workplace design Layout Exercise	Chapters 13 & 15 Handout: TAC Rhymes and Reasons
11/4	21	Illumination	Chapter 16 Handout: TAC Picture Window
11/7	22	Climate	Chapter 17 Handout:TAC Event Horizon
11/9	23	Noise and Motion	Chapters 18 & 19 Handout: TAC Caught on Tape
11/11	24	Human computer interaction 1	Handout from Wickens et al Stun: An act of God
11/14	24	Human computer interaction 2	Handout from Wickens et al
11/16	25	Usability	Notes Stun: Chutes and ladders
11/18	26	Tying it all together: Error, accidents and safety	Chapter 20 Stun: Murphy's law and Newton's law
11/21	27	Tying it all together: Human Factors and Automobiles	Chapter 21 Handout: TAC A Kid in a Car
11/23	28	Tying it all together: Systems design	Chapter 22 Stun: Genie in the bottle
11/25		***No Class - Thanksgiving***	
11/28	29	Aesthetics *Second Engineering deficiency assignment due* *Design Summary sheet due*	Notes
11/30		Comparison exercise Team Papers Due	
12/2		**Exam 3** (Lecture 20-29)	

Examinations

There will be 3 examinations. The 3 in class exams will be closed book/closed note and may cover any of the material assigned up to that point. This includes material from *Human Factors in Engineering and Design* and *Set Phasers on Stun*, other assigned readings, my lecture notes and presentations that other students have given.

Presentations

Each student will be required to give 1 brief presentation during the course of the semester on an item that exhibits deficiencies in human engineering. These will be very short presentations, about 3 minutes long, in which the student is expected to show the item or a picture of the item to the class, describe the deficiency in professional human factors terms and provide one or more design suggestions for resolving the deficiency. The item must be something you have had personal experience with (i.e. you can't bring a picture of the Three Mile Island control room, unless you were there), and can't be taken directly from Norman, BadDesigns etc. Novelty and the degree of the design deficiency, as well as the clarity and professionalism of your

presentation will be factors in your score. Because of the size of the class, time limits are strictly enforced, and part of the presentation grade.

A second presentation (on a second item) will be documented via PowerPoint, and will be turned in for grading, but NOT presented to the class.

Project

Each student will be part of a project team (3-4 students/team) that will specify a human-machine system. A sketch or concept of a system will be provided to each group that describes the fundamental design that the designers are tying to implement. It will be your job to make the final detailed specifications for the design. This is not a methods class, so no testing should be conducted. A more detailed description will be given to you in class.

1) Using the knowledge you have gained from the class, transform the design idea into a detailed specification. Provide detailed specifications of all of the components that are related to human use, (e.g. screen size, layout, brightness, control response, feedback, font, menu designs, physical ergonomics etc).
2) The specification document should be detailed enough that you could give it to someone to build the device without further input from a human factors specialist.
3) The final design should be detailed with final drawing of the design, incorporating your specifications. The drawing should be to scale. Document and show all of your design iterations. Physical prototypes may be included as well and are encouraged.
4) Prepare a team report on the design specification.
5) Prepare a design summary sheet (supplied by me) Due 11/30
6) The last day of class will be spent comparing the designs and discussing similarities and divergences in their designs.
7) Work within your teams, but do not compare notes or collaborate with other teams!!

Participation

A good deal of this class will entail open discussions of human factors issues, as well as discussions of the case studies in *Set Phasers on Stun*. Active, thoughtful participation is expected from every student. Late homework is not accepted, and missed engineering presentations will be scored as a zero.

Evaluation

Exams 1,2,3:	20% each
Project:	20%
Engineering deficiency assignments	10%
Homework/exercises	10%

Disabilities

Any student with a disability requiring accommodations in this course is encouraged to contact me after class or during office hours. Additionally, students will need to contact Disability Support Services in the Ley Student Center.

Honor System Policy

As with all endeavors at Rice, you are expected to adhere to the Honor Code and follow the guidelines given in the Blue Book. Exams are given under the honor system. Students are encouraged to work collaboratively on the projects, but each student is expected to contribute an equal share to the final project. I will be using a peer review process to assess the contributions of all the team members. Each team must work independently on the project. Selection of the individual presentation items should be done independently, but discussion of the system and its deficiencies may be discussed with other students. Students are encouraged to bring any concerns involving academic integrity to the attention of the instructor.